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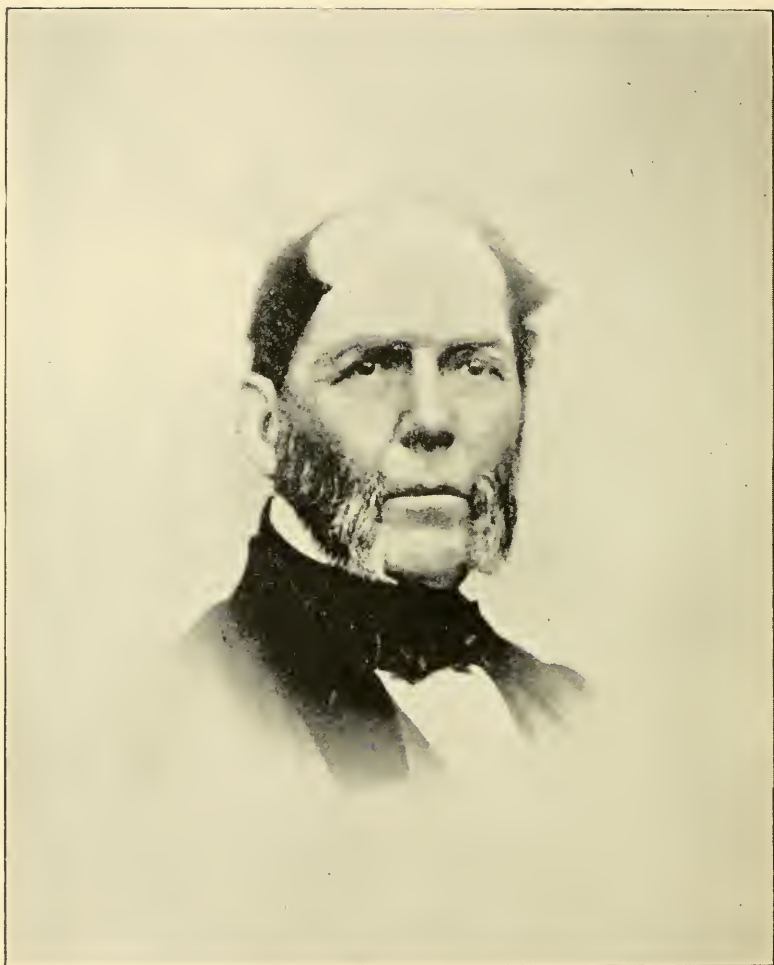
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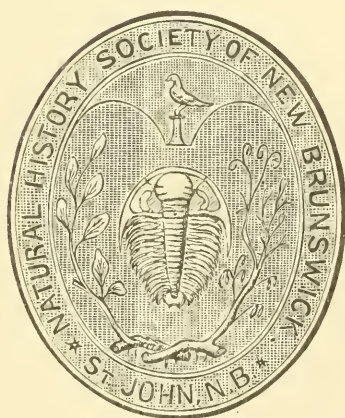
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Very Truly and
Sincerely yours
A. Garner

BULLETIN
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OF
NEW BRUNSWICK.
No. XIV.



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BULLETIN
OF THE
NATURAL HISTORY SOCIETY
OF
NEW BRUNSWICK.

ARTICLE 1.

DR. ABRAHAM GESNER — A BIOGRAPHICAL
SKETCH.

BY G. W. GESNER.

Read April 7th, 1896.

Abraham Gesner was born in Cornwallis, Nova Scotia, May 2nd, 1797. His ancestors originally came from Germany, where Conrad Gesner three hundred years ago was so distinguished for his scientific attainments as to be called the Pliny of Germany, and was ennobled by the Emperor. A branch of the family afterwards settled in Zurich, Switzerland, where Solomon Gesner became distinguished as a poet, and where his fellow citizens afterwards erected a monument to his memory.

Another branch of the family settled in Holland, from which country Dr. Gesner's grandfather, Nicholas Gesner, emigrated to New York, and settled on the banks of the Hudson River at Tappantown, in Rockland Co., about twenty miles from the city of New York.

Henry Gesner, the father of the subject of the present sketch, one of the sons of Nicholas Gesner and his twin

brother, Abraham, were about sixteen years of age when the American revolutionary war began. They were royalists, and incensed by the ill treatment of their father, Nicholas, by the cowboys of the time, one of whom removed the hat of the old man and substituted his own, saying that it was good enough for a damned tory, they crossed the Hudson at night and joined the British forces, then on the eastern bank of the Hudson, near Tarrytown.

Nicholas Gesner possessed a large property at Tappantown. The place where Major Andre was executed was upon the property of the Gesner family at Tappantown.

After serving in the war, the brothers were exiled with other royalists when New York was evacuated by the British, and went to Nova Scotia, where they were granted lands in lieu of those confiscated by the Continental Congress: the lands of Henry were situated in Cornwallis, near Cornwallis Dyke; those of Abraham in Annapolis Valley, near the mouth of the Annapolis river.

The brothers both remained staunch loyalists all their lives, and Henry often declared to his grandchildren that he believed in no other government but that of God and the king.

Among the sons of Henry Gesner were Abraham, the subject of the present biography, Gibbs and Henry. There were also several daughters.

Abraham, with the exception of the time he passed at Guy's and St. Bartholemew's hospitals in London, and "walked the hospitals," as it was termed, enjoyed no more than the ordinary instruction of the grammar schools of the day, but was always a great reader and a diligent student.

His diary, begun on the 2nd May, 1818, when he came of age, gives some revelation of his character at that time. He made several ventures in business, one of

which was carrying horses to the West Indies. None of these were profitable, however, from causes beyond his control.

On one of his voyages he was wrecked in a gale at Wreck Hill, Somerset Parish, Bermuda, the vessel fortunately pounding over the reef before it went to pieces. He and the survivors were brought to Halifax by one of Her Majesty's frigates.

On another of his voyages he was wrecked in the schooner "Mason's Daughter" on Briar Island, at the entrance of St. Mary's Bay, Nova Scotia. The crew were washed ashore in a wintry surf, and barely escaped being frozen to death.

But his courage and industry were not quelled by these misfortunes.

At the age of twenty-eight he became a student of surgery at Guy's Hospital, and of medicine at St. Bartholemew's hospital, the first being under the direction of Sir Astley Cooper, and the other under that of Dr. Abernethy.

He was noted while at Guy's Hospital for his earnest application and also his deep spirit of piety. When any physiological mystery became a subject of speculation his ultimate reason was always, "God made it so," and the phrase came to be known as Gesner's reason, and was habitually used among the students.

He was married in 1824 to Harriet, daughter of Dr. Isaac Webster, of Kentville, Nova Scotia. His children, beside three who died in infancy, were Henry, William, George Weltden, Abraham Herbert, Brower, John Frederick and Conrad. Of these two survive at the present time, George Weltden and John Frederick, both of whom are chemists and metallurgists and patentees of improvements in various branches of applied science.

They reside in New York. Brower became a surgeon in the United States army, and Herbert an eminent clergyman of the Episcopal church. Herbert's sons Anthon and Richmond are also clergymen.

After taking his degree in medicine and surgery in London, Dr. Gesner resided at Parrsboro, Nova Scotia, and was for a long time a country medical man, travelling along the shores of Minas Basin in his neighborhood and returning after visiting his patients with his saddle bag laden with specimens from along his route. His way lay in a district which was extremely rich in finely crystallized mineralogical specimens.

In 1836 he published "Remarks on the Geology and Mineralogy of Nova Scotia," and in 1838 was appointed Provincial Geologist of the Province of New Brunswick, and moved to St. John, making it his headquarters while engaged in the explorations embodied in his reports on the Geological Survey of the Province of New Brunswick, printed by the government of that province.

While living at St. John, Dr. Gesner established the Gesner Museum, afterwards purchased by the Natural History Society of New Brunswick. Its formation began with his personal collections in his various explorations. Many specimens he obtained at Parrsboro. Blomidon, on the opposite side of the Minas Basin, was a favorite locality for his researches, and all the places mentioned in his "Remarks on the Geology and Mineralogy of Nova Scotia" were visited by him in person. The animal portion of the museum was brought together at St. John. The birds were a portion of what had fallen before his own gun, as he was an excellent shot.

The moose, deer, caribou and larger animals were all stuffed and preserved at St. John, at his residence on McNab's Hill, and in setting them up several Micmac

Indians were employed, and almost any evening during the progress of the work a group of them could be seen sitting about the fire, at the end of a large attic, smoking killikiniek and chatting in their soft tongue before wrapping themselves in their blankets and going to sleep.

These Indians, many of whom were Dr. Gesner's guides in his surveys, and who were good judges of the natural attitudes and appearance of the stuffed animals, were very capable assistants in setting them up. Dr. Gesner's own study of the forest and its denizens had been careful and observant, and made him proficient for the work in hand. The Indians gave him a title, signifying "Wise Man."

After leaving St. John he returned to Cornwallis, Nova Scotia, and resided at the old homestead of his father, Henry Gesner, and there wrote his "New Brunswick, with Notes for Emigrants," and the "Industrial Resources of Nova Scotia."

He engaged meanwhile in such medical practice as the country offered, and in further study of science as applied to arts and manufactures. The dynamo of the present time was foreshadowed by many of his experiments at this place. The appliances used for covering wire with insulating material by a peculiar winding apparatus were a portion of his work.

He also constructed an electrical engine, or motor, which was driven by a voltaic battery, the principle being practically identical with that now used in electrical motors, electrical lighting and other electrical applications.

In 1850 he removed to Sackville, near Halifax. He moved to Halifax in 1852.

At Halifax he met Lord Dundonald, then admiral of B. N. A. station, who was the original discoverer of illuminating gas, and with him examined the asphaltum of

the pitch lake of Trinidad, and from it extracted a burning oil for lamps. Afterwards he extracted an illuminating oil from coal and other bituminous substances, and in 1854 patented it under the name of Kerosene in the United States. This invention laid the foundation in America of a large industry, leading to the use of petroleum for illuminating purposes and to the enormous petroleum industry as it now exists.*

At the time Dr. Gesner began the manufacture of Kerosene at New York, camphene—a mixture of alcohol and spirits of turpentine and whale oil—and certain vegetable oils, were with tallow and spermaceti candles used for affording light as well as gas.

In the manufacture of oil from coal and bituminous matter, a waxy substance called paraffin was produced in considerable quantity, and in naming the new oil it was thought best to call it “wax oil” from the Greek words *keros* “wax,” and *elaion* “oil.” The term “Keroselene” was first proposed and afterwards shortened to “Kerosene” to distinguish oils of this kind, and under that name was patented.

Even with the best skill at command the first kerosene, or coal oil, as it was also called, had when prepared for market, very considerable odor. The kerosene oil works on Newton Creek, near Penny Bridge,

* A copy of this paragraph was sent to the Commissioner of Patents, Washington, D. C., U. S. A., with a request for an official confirmation of the claims of Dr. Gesner to this important discovery, and the following reply has been received:

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

Washington, D. C., June 4, 1896. }

MR. PERCY G. HALL, Secretary of N. H. S. of N. B.

Market Building, St. John, New Brunswick.

SIR,—In reply to your letter of May 30th, you are advised that patents Nos. 11,203, 11,204 and 11,205 were issued June 27, 1854, to Abraham Gesner, assignor to the Asphalt Mining and Kerosene Gas Co., of Williamsburg, N. Y., for manufacturing kerosene oil.

Copies of the drawings of above patents can be furnished for ten cents each, and manuscript copies of the specifications for ten cents per hundred words.

By order of the Commissioner.

Very respectfully.

GEO. L. MORTON, *Chief Clerk.*

Please refer in answer to letter 72,814.

Per W. W. H.

a locality now termed "Blissville," was in 1856 quite a landmark among the factories along the creek.

In 1861 Dr. Gesner published "Coal, Petroleum and other Distilled Oils," and in 1863 returned to Halifax, where he resided until his death. He was a man of great energy and industry, and capable of enduring enormous labor. His explorations, particularly those of the Tobique and Madawaska rivers in New Brunswick, were enough work for most men in his profession, but when to these is added the effort necessary to give to his invention of Kerosene and its introduction, which was very difficult at first, the magnitude of his labor can be appreciated.

Sir Charles Lyell and Sir Roderick Murchison understood and expressed their appreciation of his geological abilities.

Shortly before his death he was offered the chair of natural history in Dalhousie College, Halifax. He was a fellow of the Geological Society of England, corresponding member of the Royal Geological Society of Cornwall, member of the Literary and Historical Society of Quebec, corresponding member of the Academy of Natural Sciences of Philadelphia, and a member of the Geographical Society of New York.

Dr. Gesner was a man of medium height, but with deep chest and square shoulders. He had black eyes, which shone brilliantly when he was excited, or in earnest conversation. His face in repose always showed reflection and deep thought, and gives one the impression of strong intellectual power. His hair was black to the end of his days—he died at the age of sixty-seven.

He had a habit when telling a good story of scratching his head with his hand, in a quick, nervous way, when he came to the point, and laughing heartily. His lively disposition probably came from his French blood

—his mother being a Pineo—a member of the Acadian family of that name.

Dr. Gesner was popular with those with whom he came in contact, and suggestions of political success and preferment were often made to him in consequence, but he could not be induced to enter the political arena, but remained true to his beloved science. He was an enthusiastic sportsman, both with rod and gun, and we have seen how he made these accomplishments the handmaids of his scientific labors.

He was very fond of music and quite a capable performer on the flute and violin in the family circle. After a wearing day's work he would seek recreation and pleasure in playing over old airs, especially the Scotch music, of which he was particularly fond. He was always abstemious and temperate in his habits of life, but liked and would smoke a good cigar. He rose early and retired early, believing in the old maxim with reference to sleeping.

Many anecdotes might be told showing the geniality and generosity of his disposition.

He remained a firm churchman all his life, and was a warden for many years of Christ Church, Brooklyn, N. Y. Here he had an opportunity of entertaining many of the clergy, some of whom had large parishes in New York. On one of these occasions he somewhat disturbed the pious serenity of a very wise looking theologian who was dining with him, and whose name was Walton, by smilingly inquiring if he was any relation to the famous Isaac Walton, author of the "Complete Angler."

A story is told showing the natural generosity of his character when superintending a Sunday-school picnic of the church to which he belonged. The picnic was held in grounds surrounded by a high board fence to protect

the scholars from a great band of waifs from the street, who had collected on the outside and were clamoring for something to eat. It was not long before the doctor had a barrel well packed with provisions thrown over the fence to the great delight and satisfaction of those outside, although they did not belong to a Sunday-school, as it broke on the ground and scattered its dainties far and wide.

Dr. Gesner lies buried in Camp Hill cemetery, Halifax, Nova Scotia.

Dr. Gesner's Reports on the Geology of New Brunswick are now difficult to obtain. Prof. L. W. Bailey and Dr. G. F. Matthew each possess a full set, the Library of Parliament has the third report, Boston Public Library two or three reports, Boston Society of Natural History two or three reports, Harvard has none, and Prof. W. F. Ganong has the first report.

The reports were issued as follows :

First Report on the Geological Survey of New Brunswick, 1839,
Henry Chubb, St. John, 87 pages.

Second Report on the Geological Survey of New Brunswick,
1840, 76 pages, eleven woodcuts.

Third Report on the Geological Survey of New Brunswick,
1841, 80 pages, nine woodcuts.

Fourth Report on the Geological Survey of New Brunswick,
1842, 101 pages, eight woodcuts.

Topographical and Geographical Report, 1843, 88 pages.

The size of the page is five by eight inches.

Dr. Gesner's geological map of New Brunswick, now the property of the Natural History Society, embodies the observations contained in Reports 1-3.

ARTICLE II.

THE RESTIGOUCHE — WITH NOTES ESPECIALLY
ON ITS FLORA.

BY G. U. HAY, M.A., F.R.S.C.

(Read December 1st, 1896.)

Last summer, in company with Dr. W. F. Ganong, I made a trip down the Restigouche in a canoe. On the morning of the 25th July, we started from St. Leonard's Station, about thirteen miles above Grand Falls on the St. John, and made the portage through to the headwaters of the Restigouche, twenty-five miles, arriving there about four o'clock that afternoon. Twelve days after we reached Campbellton after a most delightful trip, in almost uninterrupted fine weather, and upon a river that has no superior in romantic and picturesque scenery, even in this province of beautiful rivers.

Twelve years ago when I stood on Bald Mountain at the head of the Tobique and looked over the expanse of virgin forest, amid which the Restigouche threads its way through a wild and deep valley seaward, I had a desire to know more of a river that is alike the sportsman's paradise, the delight of artists, and almost a *terra incognita* to naturalists. With an appetite sharpened by twelve years of waiting, I became a willing partner in last summer's excursion.

For the first twelve miles of our portage through from the St. John to the head waters of the Restigouche we had a good road. Our portageurs—three men in all—drove ahead on a stout wagon drawn by two horses,

with our canoe and baggage, while we brought up the rear in a light wagon. The remaining thirteen miles we made mostly on foot over a very rough road.

The morning was bright and beautiful, and for two or three miles we drove along the banks of the St. John until we came to the Grand River, up the ridge bordering on whose valley we were soon winding by a succession of hills that brought us gradually to the northern watershed of New Brunswick. The view from one of the highest of these hills is strikingly picturesque. Behind us lay the broad valley of the St. John flowing with sweeping majestic curves from its home in the northern wilderness, passing the quiet villages of St. Leonard's and Van Buren, and then continuing in a long, quiet stretch as if preparing for the rush and leap at the Grand Falls. On the opposite side of the St. John lay the highlands of Maine. On our right was the narrow gorge of the Grand River, and on our left the valleys of the Siegas and Quisibis with the lofty peaks of Green River and Quisibis Mountains in the distance. Except the narrow settlement we were going through, all around was an unbroken wilderness. Along the Grand River Settlement there were three grades of settlers, nearly all French, or descendants of French, from the Province of Quebec and Madawaska County. The first grade included the oldest settlers, with passably comfortable houses, a considerable acreage of land reclaimed from the forest, with fields showing a more or less scientific attempt at cultivation. The second grade showed a link between the modern and the settler of bygone years. There was the frame house, and near by the tottering remains of the old log cabin where the "rude forefathers of the hamlet" dwelt, now a picture of ruin and distress. For what more distressed picture is there than an old

house, which in its day merely served the purpose of shelter? The last or frontier settlement is on the verge of civilization, and we are standing before the last hut before plunging into the forest. And this hut is typical of a dozen that we have seen in the last few miles. Not a vestige of a tree or shrub around the bare and comfortless hovel; a half starved geranium in the only window that fronted the roadway; a group of shy children that refused our advances and scattered to the rear of the house on our approach; a dog that growled sullen defiance and betook himself to the door where he showed his gleaming teeth in a very unmistakable way.

It is not to be wondered at that we bade good-bye to civilization (?) on that hot July day, and betook ourselves to the grateful shade of the forest with the liveliest relief and satisfaction. A great city is not the only place where we meet with extremes of wealth and poverty, of high life and low life. As we entered the woods and saw those aristocratic elms and maples and pines, we were impressed with their magnificence, and could not help thinking that if those poor settlers, when they carved homes for themselves in the wilderness had thought that they had other wants to satisfy than mere physical wants, they would have left standing one or two lordly forest trees and reared their humble roofs under their grateful shade. It seems to me that the Giver of all blessings would look down upon such a habitation as that and pronounce it "good." How much better is man, both physically and intellectually, with trees as neighbours and companions, beneath whose cool shade he can rest himself and smoke his pipe in contentment as he surveys his growing acres, and thank God for them all.

And yet in that whole settlement there was not a shade tree worthy the name, but instead a mournful line of wretched dwellings strung along the road. The man had been swallowed up in the wood chopper and *he* thinks only of chopping down the native growths, clearing up the vines and trees and shrubbery and sacrificing everything to present utility. He begrudges a few inches of soil to the rightful owners, who would thankfully bless him every day of his busy life for sparing them. But instead of thinking of the tree as a friend the settler looks upon it as an enemy, one that must be rooted out and destroyed. And tree murderers are not confined to Madawaska County.

But I started out to write notes on the flora of the Restigouche. A few miles from St. Leonard's we saw a honeysuckle which proved to be the Swamp Honeysuckle (*Lonicera oblongifolia*), a plant new to our provincial flora. Through the settlement we found the same weeds disputing the possession of the soil with the farmers as we find in other places. The Ox-eye Daisy and the Cone-flower (*Rudbeckia hirta*) in the grass-fields, the Wild Mustard in the grain fields, and a profusion of Campion flowers (*Silene Cucubalus*) on the roadside. When we entered the forest our road, which had to be cut at intervals, lay along beautiful stretches of woodland chiefly rock maple and yellow and gray birch, with a beautiful under-shrubbery of *Viburnum lantanoides*. The gentle ascents were clothed with mosses, the Twin Flower (*Linnæa borealis*), scenting the woods with its fragrant odor, and the White Oxalis (*Oxalis acetosella*), in contrast with sphagnums of the hollows with dense shrubbery of viburnums and cornuses, with pyrolas in bloom, and with some fine specimens of *Habenaria orbiculata*, its loose spike of greenish-white flowers with

their long spurs reminding one strongly of tropical orchids. This water shed, dividing the St. John from the Restigouche, is a gently undulating tableland, elevated about eight hundred or a thousand feet above the sea-level and well watered. Many of the streams trickle slowly through swamps and find their way either to the tributaries of the St. John or Restigouche. It has a soil, to judge from the vegetation upon it, nowhere exceeded in richness throughout this province, except in the alluvial valleys of its chief rivers. Derived from the disintegration of the underlying Silurian slates, the soil is apparently of considerable depth, remarkably free from stones, and would form a rich agricultural district if rendered more accessible by post road and railway. A railway across the northern part of New Brunswick from the Bay of Chaleur to the valley of the St. John, would open up for settlement this rich tract of watershed and the upper Restigouche, and bring into general view some of the most rugged and picturesque scenery of Eastern Canada. But this grand primeval wilderness would be blackened and desolated by forest fires,—the sure attendant of frontier settlements. The shrill whistle of the locomotive would be daily heard in those solitudes whose silence is only occasionally broken by the gentle sounds of the canoeman's paddle, the whirl of the angler's rod, the ringing echo of the sportsman's gun, or the clear strokes of the lumberman's axe. The adventurous spirits who love these solitudes might wish that "the greatest good to the greatest number" would be indefinitely postponed, and that the difficulties in the way of railroad communication may prove an insuperable obstacle in breaking up this sportsman's paradise.

About four o'clock on the afternoon of July 25th, our ears were gladdened by the welcome sounds of rippling

waters, and in a few minutes we stood on the bank of the Restigouche, whose praises have been celebrated in poetry and prose by delighted anglers from both continents. Its clear waters now gliding swiftly over the pebbly bottom, now reposing in some quiet pool, gave the anglers an invitation to "cast" which was promptly accepted, and a few speckled beauties gave promise of sport and welcome additions to our not over-abundant camp supplies. We found the water very low — not deep enough in the shallow places to float a loaded canoe — and that meant work for the canoeemen. But who would object to a little work in that clear mountain air and the prospect of a run of over a hundred miles on the Restigouche! We pitched our tent on that famous camping ground near the mouth of the Waagan, the resting place for many years of voyageurs like ourselves — a pretty bit of meadow but whose edges were blackened by the fires of too careless campers of other years. The camp of the absent warden was taken possession of by our guides, and before sundown we had everything in good shape for a comfortable night. But we had reckoned without our hosts — the flies. They came in swarms — mosquitoes, black flies, sand flies, bite-'em-no-see-'ems and others of the vile horde that are the anathema of woodsmen. We used all the resources at our command — smudges, veils, ointments and the mildest adjectives that our vocabulary would allow us to use, but they would not off. They wanted tribute and, like Macbeth, they would have blood. We paid the tribute as calmly as we could, and gained in experience what we lost in flesh. I took a bottle of villanous ointment that caused me more discomfort than the flies; a mosquito net kept out the largest and was not uncomfortable on hot days, with a breeze that would drive the air through it. A "smudge" is effective but it is as likely to drive you

out of the tent as the flies. The best plan we found was to choose a camping ground in the woods, and when we did so were nearly free from discomfort. One night, at the mouth of the Gounamitz, we slept on a sand beach. We never repeated that experiment. The recollections of the moonlight effects on the bluff that towered more than a hundred feet from the water on the opposite side of the river, and the rugged beauties that the morning sunlight flashed back to us from those pinnacles of rock and tree, were no compensation for that night of sleepless torture. Never sleep on a sand beach; choose a ground a trifle elevated and leafy; build two or three fires not far from the tent door; keep good hours and close up the tent early; then, if you haven't been dodging the fish warden through the day, and your conscience is clear in other respects, you will probably sleep soundly.

The old route between the St. John and the Restigouche was by canoe up the Grand River and into one of its small tributaries, the Waagansis; thence by a "carry" of three miles into the Waagan, an affluent of the Restigouche, and down that stream to the spot where we made our first camp. But that is now practically impossible owing to the filling up of the slow-running Waagan, and the dense growth of bushes which almost conceals it. I could scarcely believe that it had ever been passable for canoes. But we saw it at the height of an unusually dry season.

One of the last plants that we saw on the borders of the Grand River Settlement was the Campion Flower (*Silene Cucubalus*). It was the first to attract our attention on the pebbly beaches of the Restigouche. It was almost constantly in sight on the whole course of the river. And yet it is not a native plant, but introduced on to this continent from the old world where it occupies wide areas

from North Africa and India to the Arctic Ocean. It has evidently followed the footsteps of man, both as settler and explorer, for it is as abundant on the upper St. John as on the Restigouche. Its inflated grayish-green calyx is beautifully veined and surmounted by white petals. Growing in dense clumps, it is an attractive plant. In the woods near by we found our common Hop (*Humulus Lupulus*) and from its position here and at other points on the river it is without doubt indigenous to our province. I saw some fine specimens in fruit of the Wake-Robin or Nodding Trillium (*Trillium cernuum*), and several species of wild gooseberry and currants (*Ribes*).

I shall only make mention in connection with this trip of those plants that are new or rare to the province, or those that are striking by their great abundance, luxuriance of growth, or other distinguishing features. I feel sure that this, the first descriptive account of the flora of the Restigouche, will be full of interest to you, occupying as this river does, the northern limit of the province, and prior to the visit of Dr. Cox and Mr. Brittain, a few years ago, almost unknown to botanists. I wish to acknowledge at the outset my indebtedness to these gentlemen for lists of the plants they collected; to Messrs. R. Chalmers and R. W. Ells of the Geological Survey Department, whose valuable reports on the surface geology and forest growths of Northern New Brunswick I have availed myself of to a full extent; to Mr. Walter Deane, of Cambridge, for his assistance in identifying doubtful species; and chiefly to my sole companion of the voyage, Dr. W. F. Ganong, without whose knowledge of affairs and wide experience in wood craft, the trip could not have been made, and whose genial comradeship will always remain as one of the pleasantest features of the trip.

Let me attempt to give you a few general ideas of the topographical features of this northern heritage of ours. I may remind you that the chief watershed of New Brunswick extends from the extreme northwest limit of the province southeasterly to Baie Verte ; that the eastern slope extending from this is drained by the Restigouche, Nipisiguit, Miramichi, and by a great number of smaller rivers. The south-western slope is drained by the St. John and its tributaries, and by smaller rivers. Next to the St. John and Miramichi the Restigouche is the largest river in New Brunswick. It is 150 miles long and drains an area within the province, of 2,200 square miles, about one-fifth of that drained by the St. John, and less than one-half the area drained by the Miramichi, although, as a whole, the basin of the Restigouche is nearly as great as that of the Miramichi. Its chief tributary from the south is the Upsalquitch, and three chief branches from the north are the Katawamkedgwick, the Patapedia, and the Metapedia, one of which at least is larger than the main stream ; but the main stream is considered to have the right to the name because of its generally direct course from the watershed in Northern New Brunswick to the Gulf of St. Lawrence. The Metapedia is wholly a Quebec river, the Patapedia forms the boundary between this province and Quebec in the lower half of its course, while the Katawamkedgwick, wider and of greater volume than the Restigouche, where it joins the latter, flows only for the last forty or fifty miles of its course within New Brunswick territory. The wide divergence of these four tributaries from the main stream is the origin of the Indian name Restigouche (river of the five fingers). The Restigouche takes its rise in the north-east of the County of Madawaska, near Prospect Peak, and about twenty-

five miles north-west of our camping ground at the mouth of the Waagan. Its waters are clear and cold, from the springs and lakes of the dense wilderness to the north,—and some of these sources are probably within the province of Quebec. Its flow is strong and swift, broken by rapids on an average of every one hundred yards, but nowhere impassable for a canoe. In its course of 110 miles, from the Waagan to Tide Head, above Campbellton, there is a descent of from 400 to 600 feet. The Restigouche flows through a narrow valley, growing deeper as you descend the stream, flanked by hills rising very steep from the waters' edge, but scarcely ever too steep not to admit of a luxuriant vegetation, chiefly evergreen. In the loops formed by its winding course there may be seen, at intervals, now a stretch of meadow land, now beautiful terraces from thirty to seventy feet above the river; but so suddenly does the stream change its course and rush to the opposite side again, that these meadows and terraces alternate from one side of the river to the other in quick succession. These level spots are clothed with the most luxuriant vegetation, whose vivid green contrasts with the clear, flashing waters below them and the dark evergreen of the hillsides beyond.

Can you imagine greater pleasure than this—to sit in a canoe, paddle in hand, and wind in and out at the rate of five or six miles an hour amid scenes like these? And how we wished when our journey was ended that we had gone more slowly! Yet we only ran three or four hours, on an average, each day.

I agree with the author of "Little Rivers" when he says: "A river is the most human and companionable of all inanimate things. It has a life, a character, a voice of its own, and is as full of good fellowship as a sugar maple is of sap. * * * * The life of a river, like that of

a human being, consists of the union of soul and body. They belong together. They act and react on each other. The stream moulds and makes the shore; hollowing out a bay here and building a long point there; alluring the little bushes close to its side, and bending the tall slim trees over its current, sweeping a rocky ledge clean of everything but moss, and sending a still lagoon full of white arrow-heads and rosy knot-weed far back into the meadow. The shore guides and controls the stream * * bending it into a hundred sinuous curves * * here hiding the water in a deep cleft overhung with green branches, and there spreading it out, like a mirror framed in daisies to reflect the sky and clouds, sometimes breaking it with sudden turns and unexpected falls into musical laughter, sometimes soothing it into a sleepy motion like the flow of a dream." The author might have had the Restigouche in mind, for such a description suits it exactly.

With patches of meadow and terrace, near each other, yet separated by the river, and with precipitous hills rising on all sides, the upper Restigouche can never be a country of farms. The smallness of the terraces and meadows, the precipitous hillsides and wild scenery, are better suited for those fishing lodges, simply planned, all of them after the same pattern but in harmony with their surroundings, which we find farther down the river, perched above some salmon pool, and empty, except during the fishing season each year.

About 12 o'clock on the day following our arrival at the Waagan our guides left for home and we began the descent of the river. The prospect before us of a fortnight in the wilderness, the "paddling our own canoe" through those rapids of the curving gorges ahead, our independence of guides, the anticipation of the discovery of some new plant, sent the blood dancing in our veins with ex-

hilarating flow as we seized our paddles and shoved out into mid-stream. The success of our expedition and our own safety depend on the careful handling of our canoe. Tenderly we lift it over shallows and guide it carefully and slowly through the swirling eddies as the river rushes past some precipitous bluff. Then, as we shoot out of the rapids and glide gently over some smoother current, we rest on our paddles and gaze for a moment on the wondrously beautiful scene around us. But it is only for a moment or two. The eager and impetuous stream ahead of us is chafing over pebbles and rocks, and we must choose the course that promises the greatest safety and the least labor. But it is done safely; and the caution and unerring instincts of the steersman were rewarded by not even the approach to an accident during the whole descent of the river. Here and there, as if to lighten our task, little brooks and larger streams came dashing in with their supplies, and the river grew more expansive and deeper, but more headstrong. Our course at first lay among gently elevated hills well back from the river, not more than fifty to one hundred feet in height, but the river seemed bent on diving farther and farther into the recesses of the earth. The gorge deepened as we advanced, and the hills grew into mountains until they attained in places an altitude of a thousand feet and upwards.

On our first afternoon we passed several fertile meadows where the Ostrich Fern (*Onoclea Struthiopteris*) grew in the greatest abundance, and so luxuriant that fronds six feet in height were not rare. This fern is probably the most abundant on the river, the rich alluvial soil and cool shady ravines furnishing a most congenial habitat. A shield fern (*Aspidium aculeatum* var. *Braunii*) was found growing with the Ostrich Fern in greater abundance than

we had ever seen it before. Its fronds are usually a foot or so in height but one frond measured three feet in height. The deep green color of this fern and the light brown chaffy scales of the stipe and rachis make it one of the most beautiful and desirable of our ferns. The most common *Ranunculus* along the Restigouche was *Ranunculus septentrionalis*, especially on its upper waters, but *R. flammula* var. *reptans* was met with commonly on sandy shores, and *R. tricophyllus* in the shallow water of the ponds or bogans, where it is found with the Arrow-head (*Sagittaria variabilis*) and its many varieties, their white flowers covering the waters in greatest profusion. Hunter's Brook, about five miles below the Waagan, invited an exploration. It flows into the Restigouche from the south through a rocky gorge whose shelving and precipitous sides of calcareous slates were clothed with mosses and ferns of the most luxuriant growth. The common Rock Fern (*Polypodium vulgare*) which has been considered rare in northern countries is very abundant here. One frond measured eighteen to twenty inches in height. The green Spleenwort (*Asplenium viride*), the Bladder ferns (*Cystopteris bulbifera* and *C. fragilis*) and the Spleenwort (*Asplenium thelypteroides*) were growing here in unwonted size and variety.

The trees along the Restigouche are largely evergreen which would give a sombre character to the deep valley, but for the sparkling waters and the numerous windings which bring other characteristics rapidly into view. Of evergreens the White Spruce (*Picea alba*) is the most abundant. The Black Spruce (*Picea nigra*) is much rarer, while very few pines, and these only of one species, the White Pine (*Pinus Strobus*), are to be seen along the river. The Cedar (*Thuja occidentalis*), is quite common, so also is the Balsam Fir (*Abies balsamea*), whose long, slender

trunks often rising to the height of seventy or eighty feet and clothed with Old Man's Beard (*Usnea barbata*), are a conspicuous object along the banks. No tamaracks were seen on the banks of the Upper Restigouche and but few farther down. Of deciduous trees, the balsam poplar (*Populus balsamifera*) is the most abundant on the low grounds, and is found everywhere along the river. Elms, black, white and yellow birches, the white and black ash, maple, especially the red maple (*Acer rubrum*), with alders. Willows and sumachs are quite common.

The second day's run brought us to the mouth of the Gounamitz (Little Forks) about fifteen miles below the mouth of the Waagan. This is the first large tributary of the Restigouche and flows in from the north. The scenery about the mouth is very wild and picturesque, the cliffs rising from the river to the height of over one hundred feet. At the base of these cliffs we found growing that delicate and beautiful fern the Cliff Brake (*Pellaea gracilis*), and the *Asplenium viride*, lichens and mosses in the greatest variety and abundance, giving promise of rare and perhaps new species had we taken the opportunity to collect them. Patches of dandelion and ox-eye daisy and the song of a robin remind us we are not beyond the pale of civilization. Here we find a violet (*Viola primulafolia*), rare in this province. A mile below the forks of the Gounamitz is Boston Brook, evidently a favored camping ground. Here we found growing in considerable abundance a vetch with yellow flowers (*Lathyrus pratensis*), the only place on the river where we noticed it. Below Boston Brook the country changes to a marked extent from a hilly to a level country, but only for a mile or two,—a good site for a frontier settlement. A short distance further down, just below

Jardine's Brook, the Silurian ledges cropping out remind us of the Upper St. John and its flora. Here we find the first wild rose met with on the trip (*Rosa Carolina*), two anemones (*Anemone Pennsylvanice*) and *A. cylindrica*, the Painted Cup (*Castilleia pallida* var *septentrionalis*), *Hedysarum boreale*, the Poison Ivy, (*Rhus toxicodendron*), the Bilberry (*Amelanchier Canadensis*), *Lobelia Kalmii* and others — all Upper St. John plants.

Our fourth camping ground was near the mouth of the Kedgewick which here comes in from the north and is the largest affluent of the Restigouche. There is a fine stretch of meadow land here and a good farm, the first met with on the river, owned by Mr. Mowatt. We went about half a mile up the Kedgewick, found several rare carices, and an evening primrose (*Oenothera Oakesiana*). A little below the mouth of the Kedgewick on the right bank of the river is the fishing lodge of Col. Rogers, of New York, who owns the famous fishing pool known as "Jimmy's Hole" where the water is from thirty to forty feet deep, a steep wall of white rock rising from the eastern side; and next is Soldier's Gulch, the best salmon pool on the river. A little below on a picturesque little nook at a bend of the river we come upon the summer camp of Mr. Ayer, of Bangor, and two miles farther we reach Down's Gulch, a fine camping ground. Here we found the Grass of Parnassus (*Parnassia Caroliniana*), *Tofieldia glutinosa*, *Hedysarum boreale*, *Astragalus alpinus*, very abundant along the lower river, the purple fringed Orchis (*Habenaria psycodes*), the Rock Strawberry (*Fragaria vesca*), *Anemone cylindrica*, several rare carices and several species of juncus. For the next ten miles we pass through some of the most striking and picturesque scenery on the Restigouche. The river makes sudden turns, and leaps tumultuously from rapid to rapid, vainly strikes against the base of a

rocky eminence and recoils, seething and foaming, to take a great sweep to the right, and seek a sullen repose in the great black pool beyond. There seems scarcely room enough for the river in the narrow gorge through which it rushes, careering to almost every quarter of the compass. Salmon pools are frequent and very deep. The hills rise to the height of six hundred to eight hundred feet, and the presence of more deciduous trees, such as maples and birches renders the foliage less sombre than farther up the river. Opposite the frequent bends in the river are numerous terraces from thirty to fifty feet high, some of them, especially those at Red Bank and the mouth of the Patapedia, being of considerable extent and all in the most picturesque and beautiful situations imaginable, sloping down to the edge of deep pools and giving the opportunity to view from their vantage ground scenery that cannot be equalled in these provinces. Nearly all these terraces have fishing lodges built upon them owned by the Restigouche Salmon Club.

The Devil's Half-Acre, as might be supposed, is one of the wildest and most rugged spots, and is a precipitous bluff, whose rocky base is surmounted by calcareous slates, rising from the river to a height of some three hundred feet. His satanic majesty's preserve, however, was a very good botanical ground. The Buffalo-berry (*Shepherdia Canadensis*), *Polypodium vulgare*, *Woodsia Ilvensis*, *Solidago squarrosa*, *Potentilla arguta*, roses and pyrolas occurred, and several heath plants were seen here, although this family is somewhat rare on the Restigouche. Nearly opposite the mouth of the Patapedia (Pata-pee-jaw, with a strong emphasis on the last syllable, is the local name) is a large farm owned by Mr. Wyer, and there is considerable interval land in the vicinity. Although the salmon season was about over there was one angler who

was paying his second visit to the famous pool at the mouth of the Patapedia — the Rev. Dr. Rainsford of New York, and the next morning we enjoyed salmon fishing — by proxy.

Cross Point is a romantic spot on this most picturesque part of the river. Climbing to the top of the rocky and dizzy height which is surmounted by a rough wooden cross, we overlook a magnificent stretch of endless hills and gorges. Three hundred feet below us the river flows in a northeast direction and curving round, forming an oval peninsula, takes a directly opposite course. So closely does the river double on itself that one can sit on the narrow mountain ledge, about the width of a saddle, with a foot dangling over each stream. It is not a spot that would insure peaceful dreams for the following night if one remained very long upon it.

From the mouth of the Patapedia down we have Quebec Province on our left and New Brunswick on our right, for from the mouth of this river to the Bay of Chaleur the Restigouche forms the boundary line between the two provinces.

Our camping ground on the night of 31st July was Tom's Island, which we reached just at dark; a clear, cold night with frost or a very near approach to it — and no flies! This island, situated at the mouth of Tom Ferguson's Brook, proved so interesting in its variety of plants that we spent the greater part of the next day in investigating them. The island — or rather peninsula at low water — forms the apex of a bend in the river. The isthmus connecting it with the right hand bank of the river is of Upper Silurian limestone, highly tilted, and no doubt underlies the island. The central portion of the island is about one hundred yards long and twenty wide in the broadest part, covered with alluvial soil, and

bearing a dense vegetation, with a margin extending up river about four hundred yards of more stony material bearing shrubs and low herbs. It can readily be seen that an island in this position at a point where the river almost doubles on itself, and with a stream flowing into it from a direction opposite to that of the river would be in a good position to receive plant seed and should have a varied plant growth, and so it proved. In this limited area and on the adjoining isthmus we found over one hundred different species of flowering plants. The examination of the island proved so interesting that I must make it the subject of a separate article. I observed here the Huronian Tansy (*Tanacetum Huronense*), its first station on the river, and further east, I believe, than it has ever been noted on the continent.

We camped over Sunday on a terrace overlooking the chain of rocks, having passed safely through Hero's Rapids, the most dangerous on the river. Here we found Butterwort (*Pinguicula vulgaris*), the Shrubby Cinque-foil (*Potentilla fruticosa*), the Cleft-leaved Anemone (*Anemone multifida*), the Ground-nut or Wild Bean (*Apios tuberosa*), the Wild Onion (*Allium Schoenoprasum*), the Marsh Marigold (*Caltha palustris*), the Primrose or Cowslip (*Primula Mistassinica*), *Pellaea gracilis*, *Desmodium Canadense*, the Milk-vetch (*Astragalus oroboides*), the Beach Plum (*Prunus pumila*), *Oxytropus campestris* var. *caerulea*, the Bearberry (*Arctostaphylos Uva-ursi*), the Milkweed (*Asclepias Cornuti*), the Rattlesnake-root (*Nabalus racemosus*), the Pale Touch-me-not (*Impatiens pallida*), and other interesting forms.

Pinguicula vulgaris, which was discovered by Dr. Cox and Mr. Brittain on their trip down the Restigouche a few years ago, is a most interesting addition to our New Brunswick flora. It is probably in this province confined

to the Restigouche, and, so far as determined, occupies a narrow strip extending about twenty miles, from the Chain of Rocks to half a mile below Morissey's Rock. It belongs to the insectivorous plants, and one might wish that it was found in much greater abundance through the whole length of the Restigouche. Its area of distribution is wide, extending over the Arctic and subarctic regions of North America, Europe and Asia. On the Restigouche it is found with the primrose, mosses, and other plants loving like situations, on wet rocks over which flow waters from cold springs. It has two-lipped flowers of a violet blue color borne singly on the top of slender scapes, about six inches high, which spring from the centre of a rosette of leaves of a yellowish-green color, which rest on the rock or ground. The margin of each leaf is turned upward forming a kind of trough, and the whole upper surface of the leaves is covered with minute glands, which secrete a kind of mucilage, entrapping midges and other small insects. Like our Sundew (*Drosera rotundifolia*), these glands are not stimulated to action by drops of rain or the pressure upon them of minute grains of mineral substance, but when an organic body, such as an insect, is brought in contact with them they are stimulated and pour forth, in addition to the mucilage, an acid secretion which has the power to dissolve animal substances, behaving exactly as does the gastric juice in the animal stomach, digesting the unfortunate insect that alights upon the leaves. In the *Drosera* the tentacles which are found upon the upper surface of the leaves in such abundance aid in capturing the insects. In *Pinguicula* the upturned edge of the leaf performs that office. If the insect attempts to crawl over this margin the edge curves over still further imprisoning the insect and pushing it toward the middle to bring it in contact with as many glands as possible. After absorption

is accomplished, which usually occupies from twenty to thirty hours, the leaf expands again exposing the bleached remains of the insect, and setting a fresh trap for others. The leaves of *Pinguicula* are greasy to the touch hence its name from *pinguis*, fat. Its common name, Butterwort, is for the same reason.

A short distance below the Chain of Rocks we heard the sharp click of a mowing machine, a sign that we were approaching the outer world again and beyond was a small settlement (Mann Settlement) with further incontestable evidence of civilization — a school house. A short distance below was Deeside, a settlement which contains a church. On Green Island, near Deeside, we found growing in great abundance the Blood-root (*Sanguinaria Canadensis*) and the Pappoose-root (*Caulophyllum thalictroides*) another St. John River plant. Here too we found the Black Cherry (*Prunus serotina*). Soon we came to the mouth of the Upsalquitch with a fine club house, belonging to the Upsalquitch Salmon Club, fronting on the main river, and a little farther down a few yards below the mouth of the Upsalquitch is the fishing lodge of Dean Sage of Albany, the author of a finely illustrated book on the Restigouche.

Opposite the mouth of the Upsalquitch is the settlement of Runnymede, on a rich alluvial meadow, the joint tribute of the Upsalquitch and Restigouche.

But the last bend in the river brought into view a more imposing sight—the Squaw Cap Mountain and about two miles north of it and a little on our left, Slate Mountain. These twin peaks, the highest land along the Restigouche, rise to the height each of two thousand feet, or fully one thousand feet higher than the Sugar Loaf at Campbellton. It was half past two o'clock that day when we began the ascent of the Squaw Cap, and we were

back again at half past seven — total distance ten miles, and some of that was hard climbing, but it was worth it. For three miles our course lay along Squaw Cap Brook, a clear stream whose ice cold waters were very grateful. Mr. Jas. Harris, whose farm is about a mile in from the Upsalquitch, was our guide. He showed us a part of his farm where the grass fields were completely covered by a weed whose presence has not been before noted in this province, a Hawkweed (*Hieracium præaltum*). It is an ill favored plant about a foot high, hairy with yellow flowers in an open cyme, and a rosette of leaves which rest on the ground. So completely had these rosettes of leaves taken possession of the ground that every other form of vegetation was killed — even the grass. We had never seen a weed so completely master of the situation, and that is saying a great deal. Mr. Harris is almost in despair at the advances of this pest which threatens to cover his entire farm.

There was a wonderfully luxuriant flora along that wood road which led to the base of the Squaw Cap. The tall Joe Pye weed with its broad heads of ragged purple flowers towered above us fully eight to ten feet high: the Meadow-rue (*Thalictrum polygamum*) with its rich white and green flowers looked more delicately beautiful in this dense vegetation than ever before. Pyrolas covered the ground everywhere in those mossy woods with their racemes of nodding white or rose colored flowers. Orchids of brilliant hues grew so luxuriantly in those woods that we could imagine ourselves in tropical forests. But what is that orchid with the deep green leaves reticulated with white, and bearing a raceme of delicate brownish flowers? It was quickly gathered and consigned to the tin box, and proves to be an orchid new to the Province — *Goodyera Mensiezii*, making three of this beautiful genus found in

New Brunswick. We also found here *Goodyera pubescens* its second station in the Province. Our last half mile up the Squaw Cap was a most toilsome one, but our spirits were gladdened and refreshed by the clusters of rare ferns that grew in ringlets round this Cap—*Aspidium fragrans*, *Phegopteris calcarea*, *Woodsia glabella*, *Woodsia hyperborea*, all rare in this province and known only at one or two stations. These with other rare plants met with on the Restigouche I brought home and planted, and hope that next season I may have something better than these dried specimens to show you.

On the southern side of Squaw Cap Mountain we obtained a fine view of that great central watershed of the Province from which some single peaks rise, two thousand to two thousand five hundred feet above the level of the sea. There is easily picked out an old friend of former years—Bald Mountain on the Tobique, a trifle higher than the elevation on which we are now perched, tired and panting, but delighted. Away off to the southwest is the monarch of them all—Katahdin, in Maine, over five thousand feet high. From the north side the view is scarcely less imposing—the ranges and peaks of Quebec with the valley of the St. Lawrence beyond them. Just opposite to us, Slate Mountain, only three miles away, was wreathed in smiles of a rapidly descending sun, and beckoned us invitingly, but we turned regretfully away with many promises of a return which I hope will not lack fulfilment.

What a tramp that was! How tired we were! but when we looked over the treasures in the tin box, there was no weariness. We were delighted to see even a warden, and he looked curiously at our driers and press and the plants stowed away in them.

The river from the mouth of the Upsalquitch down is settled, and we soon come to the estuary, studded with islands, their alluvial soil rank with vegetation. On one of these islands—at the mouth of the Metapedia, we find the Maidenhair fern (*Adiantum pedatum*) and the Wild Ginger-root (*Asarum Canadense*). From Morissey's Rock we took a parting view of the Upper Restigouche, and a grand view it was. Here we found *Aspidium fragrans* again, *Woodsia hyperborea*, *Woodsia glabella* and near by *Pellaea gracilis* and the Small-flowered Anemone (*Anemone parviflora*).

SUMMARY.

We found eleven plants new to the province which are given in an appended list, with others rare or little known before. Of all our native orders the ferns seem to be of greater variety on the Restigouche than elsewhere in the province. The Leguminosæ family come next in abundance, then the Conifers the Rose family and the Compositæ. The Heath family is rarer in species here than anywhere else in the province. The presence of many alpine plants, especially near the mouths of rivers flowing in from the mountainous parts of south-eastern Quebec, is of interest.

LIST OF PLANTS NEW AND RARE.

Anemone parviflora, Mich.	Gilia (Collomia) linearis, Nutt.
A. multifida, DC.	Cynoglossum Virginicum, L.
A. cylindrica, Gray.	Pinguicula vulgaris, L.
Viola primulæfolia, L.	Asarum Canadense, L.
Astragalus oroboides.	Salix longifolia, Muhl.
Oxytropis campestris, DC.,	Populus balsamifera, L., var.
var cærulea, Koch.	Candicans (?) Gray.
Lathyrus pratensis, L.	*Goodyera Menziesii, Lindl.
* <i>Enothera Oakesiana</i> , Robbins.	G. pubescens, R. Br.
* <i>Lonicera oblongifolia</i> , Muhl	* <i>Sagittaria arifolia</i> .
* <i>Solidago Virgaurea</i> L., var	Carex atrata, L. var ovata, Boott.
alpina, Bigel.	* <i>C. flava</i> , L., var. graminis, Bailey.

* Those marked * are new.

LIST OF PLANTS NEW AND RARE—(*Continued.*)

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|--|---|
| * <i>Aster longifolius</i> , Lam., var
<i>villicaulis</i> , Gray. | * <i>C. flava</i> , L., var <i>viridula</i> , Bailey. |
| * <i>Hieracium præaltum</i> , Vill. | * <i>Phleum alpinum</i> , L. |
| <i>Arctostaphylos Uva-ursi</i> ,
Spreng. | * <i>Equisetum littorale</i> , Kuhnlewein. |
| <i>Pyrola minor</i> , L. | <i>Pellaea gracilis</i> , Hook. |
| <i>P. rotundifolia</i> , L., var
<i>asarifolia</i> . | <i>Asplenium viride</i> , Hudson. |
| | <i>Phegopteris calcarea</i> , *Fee. |
| | <i>Woodsia hyperborea</i> , R. Br. |
| | <i>W. glabella</i> , R. Br. |

* Those marked * are new.

Dr. Matthew said that Mr. Hay's paper was the most important contribution to the botany of the province since Dr. Bailey's paper, descriptive of his trip up the Tobique and down the Nepisiguit in 1867. The area of country extending from the St. John River to the Restigouche and down the valley of that river, is a plateau country underlaid by Silurian slates, and through this the valley of the Restigouche has been cut. Owing to the considerable amount of lime in those slates they produce a fertile soil, for having been formed under the sea, they are rich in animal remains. The fact that they are thus calcareous, and that they are full of cleavage planes and cracks, highly inclined, helps to give them a natural drainage, and thus improve the capabilities of the country for farming purposes. The remnant of this plateau cut and carved by the Restigouche in past ages, now stands out along its lower courses as slate hills and ridges; but towards its mouth outbursts of igneous rock have further broken up the plateau and produced hills and ridges which are represented on the map of the Dominion Geological Survey by a bright red color. The absence of Heath plants, to which the writer of the above essay refers, is a good feature in the flora, as it indicates the absence of a barren, rocky and water-soaked country, such as these plants delight in. And notwithstanding the shortness of the season and the proximity of this plateau to a hill country on each side, it should contain considerable areas of good farming land, available for settlement.

Mr. S. W. Kain said that a number of the plants referred to in the paper were of a subarctic type—*Aspidium fragrans* especially. This taken in connection with the fact that the estuary of the Restigouche, and Bay Chaleur were frozen over early in the fall and only opened in May, would seem to show that further botanical exploration in this part of the province might result in the discovery of more plants of a northern character than are now recorded.

ARTICLE III.

AN OUTLINE OF PHYTOBIOLOGY.
(PHYTOËCOLOGY.)

WITH SPECIAL REFERENCE TO THE STUDY OF ITS PROBLEMS BY
LOCAL BOTANISTS AND SUGGESTIONS FOR A BIOLOGICAL SUR-
VEY OF ACADIAN PLANTS.

BY W. F. GANONG.

The third paper of this series, dealing with "Adaptations of Plants to Reproduction, including Locomotion of Pollen," was presented to the Society on June 2nd, 1896. Since then, I have decided to withdraw it from publication, and for two reasons. First, I am convinced that it is the duty of this, as indeed of any local society, to give precedence in its publications to papers which make known the local natural history; and when means are scanty, as is, unfortunately for New Brunswick, the case with our Society, contributions of more general interest ought to give way. Second, conditions have changed greatly since I began this series four years ago. Then there was no work in English upon the subject, and no immediate prospect of any, and it had not received any unusual share of attention. Since then, Kerner's great "Pflanzenleben" has been translated into English,* important new works, together with very numerous special papers, have appeared in German, French and English, and there is

* The Natural History of Plants. Translated by Oliver. Edinburgh and New York. 4 vols.

great activity in this line of investigation. It is reasonably sure, moreover, that before long there will appear in English a concise work covering the present subject, and treating it in a not dissimilar way. It is now safe to say that long before this series could be completed upon its present lines, the necessity for it would be met by other works. Phytoecology is at present the most attractive, most promising, and, from the educational standpoint at least, most useful division of the science, and the near future must see an immense development of knowledge in it and a wide application to education and to the pleasures of intellectual life.

It will be of interest to the readers of the earlier papers if I add here my latest plan for the completion of the series. The successive papers would have been,—

Introduction and Classification. *In Bulletin No. XII.*

- A. Adaptations of Plants to Nutrition.
- B. Adaptations of Plants to Growth.
- C. Adaptations of Plants to Reproduction. *Read June 2nd.*
- D. Adaptations of Plants to Response to Stimuli.
- E. Adaptations of Plants to Locomotion. *In Bulletin No. XIII.*
- F. Adaptations of Plants to Protection.
- G. Artificial Classification and Key to adaptations, based upon size, shape, color, position, texture, etc.
- H. Ecological Plant-geography of New Brunswick.

The third paper, *C. Adaptations to Reproduction*, as presented to the Society, treated the subject as follows:

PART I. PHYSIOLOGICAL ASPECTS OF REPRODUCTION.

Fundamental meaning of Reproduction and of Sex: value of crossing in reproduction, and consequent advantage of locomotive arrangements to bring the sexual elements into contact. PART II. BIOLOGICAL (ECOLOGICAL) ASPECTS OF REPRODUCTION. *Section I.* Evolution of reproductive structures adapted to different external conditions: advance from lowest water to highest land habit. *Section II.*

Adaptations which effect locomotion of one reproductive body (male) to the other (female): problem in general similar to that of locomotion for spreading (treated in Bulletin XIII.), but in some ways more difficult: classification of possible and actually used principles of locomotion (compare Bulletin XIII., p. 7.): physical or climatic conditions under which plants live, and how these influence locomotion of the sexual elements: advance from free swimming Zoospores and antherozoids to locomotion by utilization of wind and animals, culminating in the flower, which is thus but a pollen-locomoting apparatus: full discussion of pollen-locomotion, often called cross-fertilization. *Section III.* Suggestions for study by local botanists.

I had intended to take up next *F* *Adaptations to Protection*, including enemies and weather: next *D. Response to Stimuli*, the phenomena of Irritability which deal with individual adaptation to the outside world; next, *B. Growth*, including individual and race development; next, *A. Nutrition*, of greatest importance since it determines the very existence of leaf, stem and root; *G. the Key*, so arranged that one could, by observing a certain peculiarity of structure, size, form, etc., be referred to the preceding papers where its causes are discussed. Finally should come *H.*, the application of these principles to the study of the vegetation of Acadia and its geographical distribution.

Although for the reasons given, I discontinue the series as a whole, I propose to continue the investigation of the latter section, our ecological plant-geography, and my paper "Upon the Raised Peat Bogs of New Brunswick," presented to the Royal Society of Canada in May last, and now being more fully elaborated, may be considered a first contribution to that undertaking.

These papers were addressed to the local botanists of Acadia : in concluding, I wish again to commend to them for study this subject of Plant-adaptation. All who wish to keep abreast of the advance of botanical science must give it careful attention. But those who would excel must do more : providing themselves with good books as guides, sharpening the powers of observation, reasoning and experiment, setting before themselves as the ideal the study of the plant alive, in action, and in touch with its surroundings, they must systematically, constantly and intensely devote to it their best powers.

Smith College, Northampton, Mass.,
December 12th, 1896.

ARTICLE IV.

NOTES ON THE NATURAL HISTORY AND
PHYSIOGRAPHY OF NEW BRUNSWICK.

BY W. F. GANONG.

1. UPON REMARKABLE SOUNDS, LIKE GUN REPORTS, HEARD
UPON OUR SOUTHERN COAST.

Read December 3rd, 1895 ; re written December 34th, 1896.

Everybody who has been much upon our Charlotte County coast must remember that upon the still summer days when the heat hovers upon the ocean, what seem to be gun or even cannon reports are heard at intervals coming from seaward. The residents always say in answer to one's question : "Indians shooting porpoise off Grand Manan." This explanation I never believed ; the sound of a gun report could not come so far, and besides the noise is of too deep and booming a character. I have often puzzled over the matter, and it is consequently with great pleasure that I find in "Nature" for October 31st, 1895, a short article by Professor G. H. Darwin, in which he calls attention to the occurrence of what is obviously the same phenomenon in the delta of the Ganges, upon the coast of Belgium and in parts of Scotland, and in which he asks for experiences from other parts of the world. Two explanations are suggested by his correspondent, M. Van den Broeck of Belgium, who called his attention to the phenomenon, one that the reports are of

atmospheric origin, due to peculiar electrical discharges, the other that they are internal in the earth, due, perhaps, to shock of the internal liquid mass against the solid crust. The following number of "Nature" contains notes which suggest that the reports may accompany the formation of faults or may result from earthquakes too slight to be otherwise perceived, and later numbers of that Journal contain numerous letters upon strange sounds heard in different parts of the world, with various explanations.

The discussion upon the subject by this Society on December 3rd, 1895, has called out further information showing that others besides myself have noticed these or similar sounds in New Brunswick. The late Edward Jack, a keen observer of things in nature, wrote me under date December 13th, 1895,—“I have often noticed in Passamaquoddy Bay when I was duck shooting, in the early spring mornings, the noises of which you speak; they always seemed to come from the south side of the Bay. They resembled more the resonance from the falling of some heavy body into the water than that of the firing of a gun, such as is produced by a cake of ice breaking away from a large sheet of it and toppling over into the sea. These noises were heard by me only in very calm spring mornings when there was no breath of air . . . there was nothing subterranean in them.” Captain Charles Bishop of the schooner “Susie Prescott,” has told Mr. S. W. Kain that he has heard these sounds forty miles from land between Grand Manan, the Georges Banks and Mount Desert Rock. They are reported also from the Kennebecasis. Mr. Keith A. Barber, of Torryburn Cove, wrote December 26th, 1895, to this Society,—“I have heard sounds similar to those . . . on the Kennebecasis in the warm days of summer. They seemed to come from a southeasterly direction.” Mr. Arthur Lordly,

a member of this Society who resides in the summer at Riverside, has also told Mr. Kain that he has heard similar sounds, on clear warm days, on the Kennebecasis from a southwest direction. No other reports of this occurrence in New Brunswick have reached me. The *Scientific American* (June 27th, 1896, p. 403) has called attention to them and requested that observations be communicated to its columns, but apparently so far without result.

The latest opinion as to the origin of the sounds appears to favor an atmospheric origin, possibly connected with electrical disturbances. A very detailed circular, calling for exact observations, with series of questions and blank forms, has been issued by M. Van den Broeck of Brussels, who appears to have been the first to call scientific attention to them. It is very desirable since the sounds occur here, that they should be scientifically observed and recorded ; and it will be best to communicate the results to this Society, through which they will reach those who can make the best use of them. To secure the best results the following form, altered somewhat from M. Van den Broeck's circular, should be followed.

Name of observer.

Date of observation.

Exact place of observation.

Exact time of each observation.

Direction of the sound.

Character of the sound (full description with comparisons).

Wind, direction and velocity.

State of the sky.

State of the sea.

Mist conditions.

Barometer (state of the weather a few hours before and after).

Temperature.

Other remarks, including suggestions as to their origin, and reasons why they cannot be gun reports.

2. THE OUTLET-DELTA OF LAKE UTOPIA.

Read June 13th ; re-written December 22nd, 1896.

Lake Utopia is probably the most beautiful of New Brunswick lakes. It possesses several features of scientific interest, and among them one which must be rare, namely, a delta at its outlet. I cannot find any reference to this delta in any of our geological reports, nor do I remember reading of anything similar elsewhere. The lake empties into the Magaguadavic River by a thoroughfare, locally called "the Canal" which occupies a break in the rocky hills and is about two miles in length with a



FIG. 1. Sketch map of Lake Utopia, in part after the 1797 survey map. Depths, in feet, from the latter map.

very uniform breadth. Where it leaves the lake, however, it is between two alluvial points which project nearly half a mile from the main shore. These points can be seen to be growing outward and the appearance is that of a delta at the mouth of a stream, though of reversed shape, and it looks strange enough at a lake outlet.

The points together form a triangle with its base against the mainland and the canal dividing it from the

middle of the base to the apex. Their extreme points are very low and muddy and sink gradually under water to continue as shallows still farther out, but in one place they come to the surface again as a small marshy island, which, perhaps, marks the beginning of the splitting of

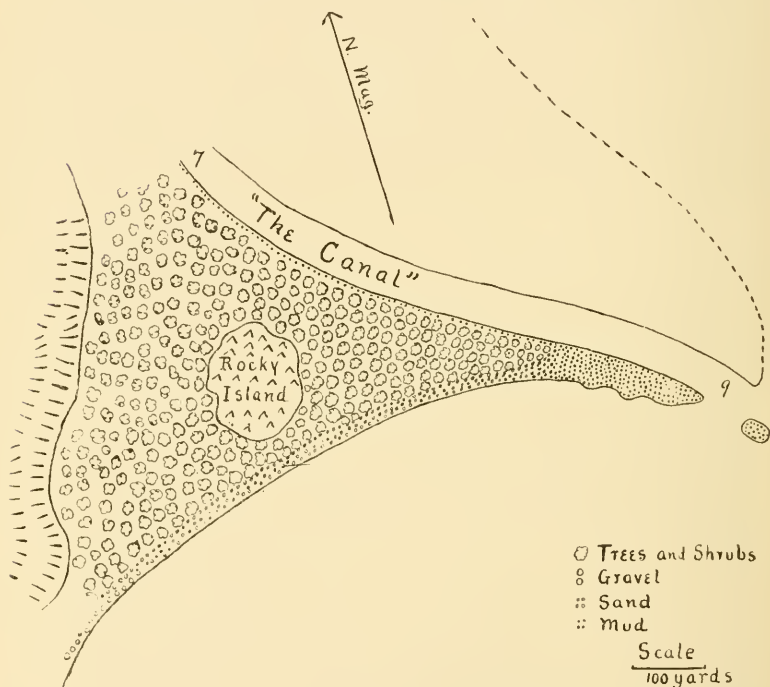


FIG. 2. Sketch map of the Delta. Depths from the 1797 survey map. Only the southern point was studied; the dotted line shows the probable outline of the northern point. The map is a mere sketch to illustrate points in the paper and topographically must be very inaccurate.

the channel into two. The characteristic grass of the shallows is *Glyceria fluitans* R. Br. Farther in the land rises very gradually, the mud becomes firmer and bears a great deal of the small sedge, *Eleocharis tenuis*, Schultes. Here the bank is very steep on the canal side, near which

it is highest, but slopes off very gradually on the lake side, a characteristic of banks built up by the overflow of sediment-carrying streams. About two hundred yards from its apex, the southern point, the only one I was able to study, is forty to fifty yards broad, and here the sand, which is being gradually washed up by the lake over the mud, reaches the canal bank. Here low bushes appear and some forty yards further in the trees begin. After this the point broadens rapidly. Still further in is a dense alder swamp, from which arises in one place a high rocky island which has been surrounded by the delta in its growth. All along on the lake side is a splendid sand beach sweeping away in a grand curve to the main shore.

But the explanation of the presence and form of the delta is not difficult. It is at times at the mouth of a stream. The relation of the lake to the Magaguadavic River is peculiar, and happens to be so adjusted that at a certain height of water, both are on the same level and there is no movement through the thoroughfare. But, as the water rises after rains, it rises far more rapidly in the river than in the lake, which has but a small drainage basin, and pours into it through the thoroughfare. It then of course drops its sediment as it meets the still water, the chief requisite for delta-formation. As the water falls it flows out from the lake, but too gently to remove much of the sediment which has already settled to the bottom. It seems plain from the structure of the points, that the canal forms upon each side, by its sediment, only a bank of some forty to fifty yards broad, and that the remainder of the delta has been formed by the lake which is incessantly washing up sand, working it out along the lake-faces of the points and filling in the angles between them and the main shore. The very swampy character of the older parts of the delta is due of course

to the prevention of drainage by the banks built up on the canal and lake sides. I could not determine the causes of the direction of the points and channel.

As the points are still growing it is fair to conclude that in time the delta will extend completely across the lake and divide it into two, a process which is known to have occurred in lakes elsewhere by the growth of the deltas of mountain torrents, but of which we have, I believe, no example in New Brunswick.

Mr. S. W. Kain has called the attention of the Society to the great shallows at the outlet to Grand Lake, Queens County, suggesting that they were formed in a similar way by sediment brought through the Jemseg. This is no doubt correct, but the conditions are here rather less remarkable, since Grand Lake, Jemseg and the St. John are but slightly separated parts of one former lake basin, while at Lake Utopia the river and lake are in separate rocky basins.

The points are not shown on the geological survey map nor on the corrected surface geology map, but they are plainly marked on the original survey map of 1796-'97, upon which also the depths of the lake are given. The thoroughfare near the lake is marked as seven feet deep, at the extreme points as nine feet, while a quarter of a mile further out it is only thirteen feet. But still further out the depths are thirty-three, forty-two and fifty feet, showing clearly that the delta is being pushed out into the lake. I could not myself, for lack of a boat, measure depths. Of course the delta is entirely post-glacial, because the lake is formed by the glacial dam between it and Letang. Possibly at one time the entire Magaguadavic River flowed by this route to the sea. If we could accurately measure the rate of growth of the delta, we would, by measuring also its size, be in posses-

sion of data for estimating how long ago the glacial period closed. Lake Utopia has, as I have said, other features of scientific interest, and I can imagine no more attractive problem than an exhaustive investigation of its hydrography, physiography and natural history.

New Brunswick thus possesses two reversible river phenomena—a fall at St. John and a lake inlet-outlet at Lake Utopia. The presence of these striking grassy points explains the significance of the name given by the Passamaquoddies to the lake, about which I had previously to my visit last summer been much puzzled. They call it *Mes-ke-qua-gum* which means “lake with grass (or bulrushes) around it,” no doubt referring to this place; the name is altogether inappropriate elsewhere about it. Its English name was given by Governor Carleton when he found that the farms assigned to some of the Loyalists were under its waters—they were truly Utopian so far as any use to their owners was concerned.

3. UPON TEMPERATURE-MEASUREMENTS WITH THE THERMOPHONE IN CLEAR LAKE, LEPREAU.

(Read December 1, 1896.)

Clear Lake, Lepreau, is a gem in itself and a joy to the naturalist and physiographer. It lies at the west of St. John County, is about a third of a mile long and half as broad, of a shape shown in the accompanying map, and empties into Little Dipper Harbor. It occupies the upper end of a westerly-sloping trough formed between conglomerate rocks of Devonian age standing at high angle, and appears to be held in place by a glacial dam. Its level is very uniform, summer and winter, and its outlet is said to be constantly running, though it has no visible inlet. Its water is clear and its shores very clean,

of rock, gravel and sand, with no mud. Its animal and plant life show some features of interest, worthy of more extended notice. It is noted for the immense trout it contains, a fact which I give from heresay, since my own numerous experiments upon this point yielded only negative results. It is locally reputed bottomless, but in the summer of 1895 Mr. S. W. Kain and I sounded it thoroughly and found its maximum depth to be seventy-eight feet; but this is a great depth for so small a lake. Its beaches, as a rule, slope down very suddenly, so that its average depth must be considerable.

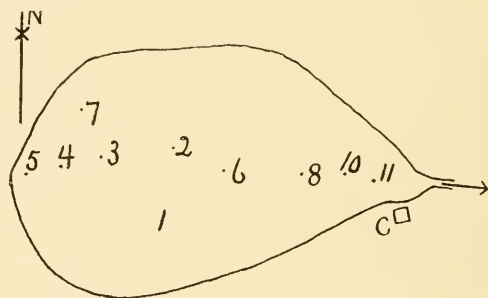


FIG. 1. Sketch map of Clear Lake. C = log camp. Scale about six inches to one mile.

Last summer I was enabled by the courtesy of Professor John T. Stoddard, of Smith College, Northampton, Mass., to bring to New Brunswick the Thermophone belonging to the department of physics in the college. By this instrument, recently invented, temperatures can be read at any distance and in any position to which a metal coil can be sent. Its principle cannot be explained*

*It depends upon the fact that the electrical resistance of metals varies with temperature. Two pieces of (different) metals forming the "temperature coil" are connected up as a "Wheatstone Bridge" and so connected with a special battery and telephone that the latter hums while resistances are unequal and a current is passing through it, but becomes silent as a sliding contact equalizes the resistances, and a pointer then indicates upon a scale the temperature in the distant coil. The instrument is very accurate, and temperatures can be read it is said to .1°, though in a moving boat in a breeze about .25° is as easy as one can read easily. It is made only by E. S. Ritchie & Sons, of Brookline, Mass.

in a few words. I had expected to use it in my studies upon the temperature of raised peat bogs, but the temperature coil could not be thrust deeply enough into the bog to make it of use. It occurred to me, however, that by its aid I might be able to determine whether or not the constant flow from Clear Lake is due to the presence of springs. On July 1st, 1896, I went to the Lake with two companions and favored by good weather, made a series of temperature measurements, of

Station No .		5	11	7	3	4	8	10	1	6	2	AVERAGE. 0
Depth in Feet,		19	24	32	45	46	46	60	72	72	73	0
DEPTH FROM SURFACE IN FEET.	3	65	65	65	65	65	65	65	65	65	65	65
	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	9	.....	.....	.....	.....	.....	.....	.....	65	.....	.....	65
	12	.....	.....	.....	65	65	.....	.....	.....	.....	.....	65
	15	64½	65	65	64½	64½	.....	65	64	65	65	64 2-3
	18	63	65	63½	63	63	65	.....	.....	64½	64	63 7-8
	21	...	64½*	59½	59	59	59	.....	.....	59½	59½	59 1-4
	24	.....	55½	55	54½	55	55	.....	.....	54½	53½	54 5-7
	27	.....	.....	50½	51	51	50½	.....	.....	51	50	50 2-3
	30	.....	.....	47	47½	48	48	47½	48	47	47½	47 9-16
	33	.....	.....	.....	.....	46½	46	.....	.....	46	.....	46 1-6
	36	.....	.....	.....	.....	45	45	.....	.....	45	.....	45
	39	.....	.....	.....	.....	44½	44½	.....	.....	44	.....	44 1-3
	42	.....	.....	.....	44½	44½	43½	.....	.....	44	.....	44 1-8
	45	.....	.....	.....	.....	44	43½	43½	43½	43½	43½	43 7-12
	48	.....	.....	.....	.....	.....	.....	.....	.....	43½	.....	43 1-2
	51	.....	.....	.....	.....	.....	.....	.....	.....	43	.....	43
	54	.....	.....	.....	.....	.....	.....	.....	.....	43	.....	43
	57	.....	.....	.....	.....	.....	.....	.....	.....	43	.....	43
	60	.....	.....	.....	.....	.....	.....	42½	42½	43	42½	42 5-8
	63	.....	.....	.....	.....	.....	.....	.....	.....	42½	.....	42 1-2
	66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	72	.....	.....	.....	.....	.....	.....	.....	42½	42½	42½	.....

* Appears to be in error ; neglected in the average of this line.

which the results are given in the table. The stations, excepting a few trial ones, are shown upon the map (Fig. 1). I took the temperatures only for each yard of

depth and read only to half a degree; but it would have been far better, if time had allowed, to have taken them for every foot and for smaller fractions of a degree. In the diagram (Fig. 2) the results are shown graphically, bringing out clearly A, the absolute fall, and B the rate of fall in temperature at the different depths, and C the amount of vertical space occupied by each degree of temperature. The air temperature in the morning over the lake was 71° F.

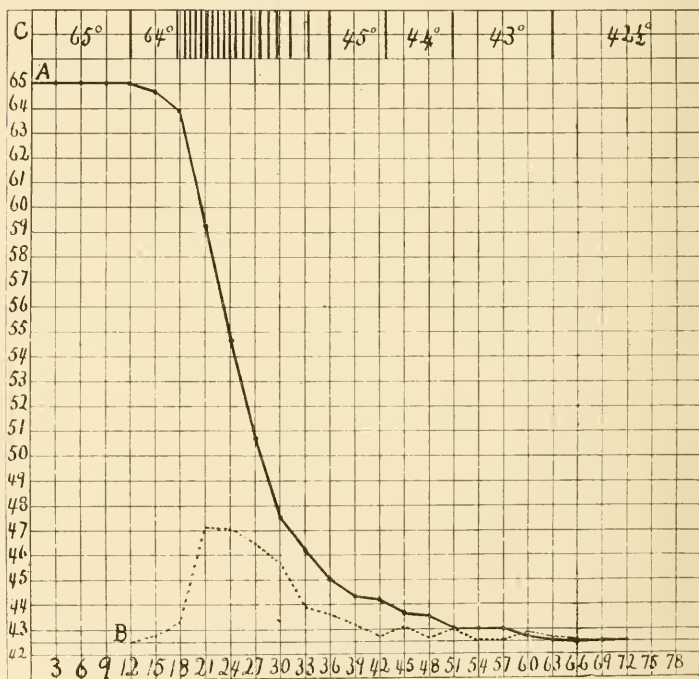


FIG. 2. Diagram of temperature in the lake.

Figures on abscissa (horizontal) = depths from surface in feet.

Figures on ordinate (vertical) = degrees Fahrenheit.

A = absolute drop in temperature. B = rate of drop at the different depths. C = amount of vertical space occupied by each degree (approximate), obtained by extension from the points where the curve A crosses the temperature lines.

(The irregularities in the curves between 39 and 63 feet are of course due to the relative coarseness of the measurements. No doubt very minute measurements would give even curves. In curve B is a slight error in the drawing; on line 30 the point should be lower, and on 33 higher, so curve from 27 to 36 would be more even).

In synopsis the results are as follows :

1. For the first 12 feet there is no appreciable fall in temperature : from 12 to 18 feet there is a slight fall, $1\frac{1}{8}^{\circ}$; at 18 feet a very abrupt fall begins and continues nearly evenly to 30 feet, and in these 12 feet it drops no less than $17\frac{7}{16}^{\circ}$, or about $1\frac{1}{2}^{\circ}$ per foot; below 30 feet the rate of fall diminishes until the minimum $42\frac{1}{2}^{\circ}$ is reached at about 60 feet.

The meaning of these figures is no doubt this: that down to 12 feet the effect of the sun's light and heat is strongly and evenly felt, and the surface movements help to distribute it; after about 12 feet the heat has been largely absorbed, while at 18 it has been almost entirely taken up; the layers below that probably derive their temperature by conduction from those above them.

2. There are faint indications in the table that at depths below 30 feet the temperature near the bottom in the shallower places is slightly higher than at the same depths over deeper places, indicating that the ground slightly warms the water in contact with it, which is to be expected since it is a better conductor than water. But so slight are these indications that they may be neglected and it may be said, at least of the greater depths, that their *temperature is a function of distance from the surface* and bears no relation to the bottom.

3. The results give no positive information about the presence of springs.

It would have been of great interest had I been able later in the summer to make a second series to determine whether the average temperature of the lake was raised throughout, but this was not possible. I have not been able to compare the results obtained by others elsewhere, though with other instruments the subject has been much studied in Europe, and to some extent in America.

These results were not the product of a deliberately planned investigation, or they would have been far more minute and full, but were merely the gatherings of a holiday excursion.

As this paper is passing through the press I have had the opportunity, through Professor Stoddard's courtesy, to read an important article by the inventors of the Thermophone—"The Thermophone, a New Instrument for Determining Temperatures," by H. E. Warren and G. C. Whipple, in *Technology Quarterly*, for July, 1895. In this the inventors fully and clearly describe the instrument, and give in synopsis some of the results obtained by its use. My results, as far as they go, agree with theirs; but the latter show remarkable seasonal changes, and a distribution through the year which is determined largely by the different density of water at different temperatures, especially when near the freezing point.

ARTICLE V.

NOTES ON THE OCCURRENCE OF TWO SHREWS
NEW TO NEW BRUNSWICK.

BY PHILIP COX A. B. B. Sc., PH. D.

Read May 5th, 1896.

In Bulletin No. X., 1892, reprinted from No. III, 1884, Mr. Montague Chamberlain records two shrews from the province,— the Common Shrew, *Sorex platyrhinus*, and the Western Shrew, *S. cooperi*. Though what are now regarded as two distinct forms were designated *platyrhinus*, the first by Prof. Baird (Mammals of N. A. 1857), the *Otisorex platyrhinus* of De Kay (New York Mammalia, 1842); and the second by Dr. Dobson (Monog. Insectivora, 1890), it would seem that the animal referred to in the list is that of Baird's description, as the other, now designated *S. fumens* Miller (North American Fauna, 1895) is exceedingly rare, and had not been recognized as a distinct species when Dr. Jordan published his Manual of Vertebrates, whose classification and nomenclature Mr. Chamberlain says he adopted. Moreover, the latter describes the animal as "common," a term best applicable to Baird's *platyrhinus* which is the most abundant in the province. It is, too, exceedingly variable, and well deserves the name "*personatus*" bestowed on it by Geoffroy Saint Hilaire early in the century, which on grounds of priority is its specific designation at present.

In a recent monograph on the shrews of North America, Dr. C. Hart Merriam maintains the specific

identity of *S. cooperi* Bachman, and *S. personatus*; and hence the former name becomes a synonym of the latter.

The writer has lately collected Richardson's Shrew, *S. richardsoni* Bachman, a robust boreal form fairly common in the northwest and northern part of the Central Plain, its known range, with the exception of northern Minnesota, being entirely Canadian. Its occurrence on the Atlantic seaboard, nearly two thousand miles away, is the most striking example of discontinuity in the distribution of any known mammal, far exceeding that of the Varying Hare of Europe. When the Canadian fauna comes to be more thoroughly investigated, this species will probably be found more or less distributed over the immense stretch of continent now forming such a strange break in its distribution. It is quite common on the intervals and low wooded lands adjacent to the St. John in Manguerville, Sunbury County.

I am not aware that *S. fumeus* Miller has ever been recorded from the province, its nearest locality being New Hampshire. In February, 1895, the writer took a single specimen in coniferous woods in the parish of Manguerville. It is of a uniform dark slate color with a tail longer than is usual in members of the genus. It is a sub-boreal form frequenting southward the upper portions of mountains; and does not seem to have had any previous Canadian record. It is very rare.

APPENDIX.

REPORT ON ZOOLOGY.

BY PHILIP COX, PH. D.

(Read May 5th, 1896.)

The Committee have to record the following additions to the Fauna of New Brunswick :

MAMMALS.

- Erotomys fuscidorsalis* Miller. Locality, Tobique. New to science. J. A. Allen, New York.
E. gapperi Vigors. Red-backed Mouse. Locality, Maugerville, Cox.
Sorex thompsoni Baird. Thompson's Shrew. N. B. Dr. Bailey.
S. richardsoni Bachman. Richardson's Shrew. Locality, Maugerville. Cox.
S. fumeus Miller. Locality, Maugerville. Cox.
Putorius noveboracensis DeKay. American Ermine. Locality, Sunbury Co. Cox.

RECENT ADDITIONS TO THE LIST OF NEW BRUNSWICK FISHES.

Liparis lineata Kröyer. Sea Snail. Taken at North Head, Grand Manan, by Mr. Moses, and donated to the Natural History Society of New Brunswick by Messrs. Patterson and A. McLean. A deep sea fish ranging from the polar regions to Cape Cod.

Maurolicus borealis Gunther. Argentine. Found dead on the sea-shore at the same place and by the same person, and donated by the above named gentlemen. A small pelagic fish, with opercular apparatus incomplete, and skeleton scarcely ossified; of a bright silvery appearance, with the inferior parts thickly studded with phosphorescent spots. The only Canadian record known to the writer.

BIBLIOGRAPHY OF SCIENTIFIC PUBLICATIONS RELATING TO THE
PROVINCE OF NEW BRUNSWICK OTHER THAN THOSE CON-
TAINED IN THE BULLETINS OF THE SOCIETY, 1896.

BY SAMUEL W. KAIN.

As stated in Bulletin XIII., it is proposed to publish each year the titles of all works, other than those contained in the Bulletins themselves, relating to New Brunswick, on the subjects coming within the scope of the Society's work.

The list published in Bulletin XIII. contained titles from 1890 to 1895. The present list contains titles from December 1895 to December 1896.

GEOLOGY.

MATTHEW, G. F.—Traces of the Ordovician System on the Atlantic Coast. *Trans. Royal Society of Canada, Vol. I. (2nd Series), Sec. iv., pp. 253-271, pl. 2.* 1895.

Organic Remains of the Little River Group. *No. IV. Ibid., pp. 273-279, 5 illustrations.* 1895.

Notes on Cambrian Faunas—the Genus *Microdiscus*. *Am. Geologist, Vol. XVIII., No. 1, pp. 29-31.* July, 1896.

Faunas of the Paradoxides Beds in Eastern North America. No. 1. *Trans. New York Academy of Sciences, Vol. XV., Sig. 12, pp. 192-247, 4 pl.* August 3, 1896.

On the Occurrence of Cirripedes in the Cambrian Rocks of North America. *Ibid., pp. 137-140, 2 figures.* 1896.

PHYSIOGRAPHY.

DAWSON, W. BELL.—Note on Secondary Undulations Recorded on the Self-recording Tide Gauges; and on Exceptional Tides in Relation to Wind and Barometer. *Trans. Royal Society of Canada, Vol. I. (2nd Series), Sec. iii., pp. 25-26, 2 drawings.* 1895. (Refers to secondary undulations at St. John, N. B.)

GAXONG, W. F.—The Outlet Delta of Lake Utopia. *Progress, June 13, 1896.* (Reprinted, Leaflet, 3 pp.)

REYNOLDS, W. K.—Recording the Tides (at St. John, N. B.) *The Daily Telegraph, St. John, N. B., October 28-30, 1896.* (A popular account of the tides at St. John, explaining purpose of the tide gauge, position of the "bench mark" and amplitude of the harbor tides.)

METEOROLOGY.

GANONG, W. F.—Remarkable Sounds (from the Bay of Fundy).
Nature, Vol. LIII., 101. December 5, 1895.

Upon the Gun Reports Heard Upon Our Southern Coast.
(Note.) *St. John Daily Sun*, December 7, 1895.

“Barisal Guns” and “Mist Pouffers.” *Scientific American*, Vol. LXXIV., No. 26, June 27, 1896. (Refers to Prof. Ganong’s Observations.)

BOTANY.

JACK, I ALLEN—Our Wild Flowers, 20 pp. St. John, N. B., 1896. (Reprinted from a series of papers published in the *Daily Sun*.)

ZOOLOGY.

BAIRD, FRANK—The Moose of Eastern Canada. *Canaland*, Vol. LV., No. 5, pp. 135–189. October, 1896.

GANONG, W. F.—Do Young Loons Eat Fresh Water Clams?
The Auk, Vol. XIII., pp. 77–78. January, 1896.

PRINCE, E. E. The Sardine Fishing Industry in New Brunswick. *Special Report of Commissioner of Fisheries*, Part III. Ottawa, 1896.

SHEWEN, E. T. P.—Teredo Notes. *Report of the Minister of Public Works (Canada)*, for 1895, pp. 245–250. Ottawa, 1896.

VANWART, ROY McL.—New Brunswick Woodpeckers. *University Monthly (Fredericton, N. B.)*, Vol. XVI., No. 1, pp. 8–9. October, 1896.

Frogs (of New Brunswick). *Ibid.*, Vol. XVI., No. 2, pp. 35–36. November, 1896.

THIRTY-FOURTH ANNUAL REPORT
OF THE
COUNCIL OF THE NATURAL HISTORY SOCIETY
OF NEW BRUNSWICK.

The Council of the Natural History Society beg leave to submit the following report for the year now ending :

MEMBERSHIP.

There has been no important change in the membership, but it is highly desirable that the roll should be much enlarged. Additions are noted as follows :

Ordinary Members	5
Associate Members	6
Corresponding Members	4
	—
Total increase.....	15

During the year two of our members have been removed by death.

Edwin Fisher died on July 11th, 1895. He was for many years a member of the Council and a well remembered attendant at the meetings of the Society.

Edward Jack, C. E., died on December 31st, 1895, at Fredericton. He was for many years a corresponding member of the Society, and was a recognized authority on the forestry and natural resources of this province. In his library, now in possession of D. R. Jack, Esq., of this city, is a large collection of note-books, lectures and newspaper articles, containing much relating to the early history of this province, as well as a great fund of information in regard to the forests, moors, lakes and streams that he knew so well.

FINANCE.

The report of the Treasurer shows a small surplus of receipts over expenditures :

Balance from last year.....	\$ 52 31
Dues collected.....	84 00
Government grant.....	125 00
Interest on investment.....	144 00
Other items.....	31 30
	<hr/>
	\$436 61
Current expenses.....	374 87
	<hr/>
Balance.....	<u>\$61 74</u>

LECTURES AND ESSAYS.

During the year eleven meetings of the Society were held, at which the following papers were read :

1895.

- Jan. 15 Recent Discoveries in the Pre-cambrian Rocks of Brittany. Annual address of President, Geo. F. Matthew.
- Feb. 5 The Geological History of the Vertebrates. Philip Cox, Ph. D.
- March 4 The Eskimo and his Origin. H. G. Addy, M. D.
19 Teredo Notes. By E. T. P. Shewen, C. E. Published in Report of Public Works Department of Canada, pp. 245-250, 1896.
- April 2 (1) The Outlets of the River St. John. By Robert Chalmers,
(2) Points in the Geology of the St. John River Valley. By Professor L. W. Bailey.
- May 7 The Volcanic Rocks of the Maritime Provinces. By Wm. D. Matthew. (Published in Bulletin XIII, 1895).
- June 4 The Adaptations of Plants to Locomotion. By W. F. Ganong. (Published in Bulletin XIII, 1895).
- Oct. 9 Report on Summer Camp held at Lepreau. By Geo. F. Matthew, Geo. U. Hay and W. F. Ganong. (Published in Bulletin XIII, 1895).
- Nov. 5 (1) The Chemical and Microscopical Examination of Blood. By W. F. Best.
(2) The Unsuitability of the Bay of Fundy for Oyster Culture. By Samuel W. Kain.
- Dec. 3 Egypt and the Monuments. By Mrs. Emma Fiske.
- 1896.
- Jan. 7 (1) Trinidad. By J. V. Ellis, Jr.
(2) Note on the Occurrence of the Long Billed Marsh Wren near St. John. By John Brittain.
(3) Note upon the "Gun Reports" heard upon our southern coast. By W. F. Ganong.

The following course of elementary lectures was given :

1895.

Jan. and Feb. Geological History of the Invertebrates. By Geo. F. Matthew.

March. Geological History of the Vertebrates. By Philip Cox.

April. Classification. By W. M. McLean.

May. Spring Plants. By Geo. U. Hay.

LIBRARY.

The Library shows a considerable increase. Two donations of a large number of books and pamphlets were received from Dr. Matthew and Mr. Hay. Cards have lately been procured to be used in making a catalogue.

BOTANY.

The report of the Botanical Committee for 1895 is contained in Bulletin No. XIII.

A valuable addition to the museum in this department is the collection of about 1,000 plants, presented by Prof. Fowler. These are the plants described in the list of our flora given in Bulletin IV.

MUSEUM.

The collection of mollusca has been cleaned, arranged and catalogued. This is an important work, as the shells were previously in an unsatisfactory condition. Numbers corresponding to those in the catalogue need to be fastened to many of the specimens, by which they could be permanently identified.

The cases in the invertebrate room, containing corals, shells and crustacea, have been made dust proof.

We should notice Dr. W. F. Ganong's donation of the remainder of his collection of invertebrates of the Bay of Fundy, consisting chiefly of the rare and critical species.

Dr. Cox, of the Dominion Fisheries Department, spent some weeks in the museum, making use of the library and specimens in connection with his official work.

PUBLICATIONS.

Bulletin No. XIII has just been issued. It is larger than usual and will be found to contain much of local interest. Chiefly to be noticed is Dr. Cox's article on the New Brunswick fishes, giving a list of the species, which will be of much economic, as well as scientific value.

SUMMER CAMP.

The Summer Camp of 1895 was held at Lepreau Basin, in July. It was attended by thirty members, and others, and was very successful. Among those present were Dr. Bailey and Professors W. F. Ganong and A. W. Duff. An account will be found on page 89 of Bulletin No. XIII.

GENERAL.

The Room Committee have made several changes in the heating arrangements. A stove has been placed in the invertebrate room, and a new one obtained for the lecture room. A great improvement has been made in the appearance and accommodation of the library, by a large new case, which gives room for a proper arrangement of the books and periodicals.

The visitor's book shows that a large number of persons have visited the museum during the year and examined the collections.

We all wish for the time when an attractive building, with ample room for a well arranged museum, will continue to be a place of interest for all visitors to the city, as well as for the citizens themselves.

To those who prepared the many interesting papers and lectures heard during the past year, the thanks of the Society are due; as also to the press for the insertion of notices and reports of meetings.

Respectfully submitted,

GEOFFREY STEAD.

Secretary to Council.

DONATIONS TO THE LIBRARY, 1895.

DONOR'S NAME.	RESIDENCE.	WORK.
Royal Society.....	London.....	Proceedings.
Royal Colonial Institute	do	Journal
Geological Society	do	Abs. of Proceedings.
Director Royal Gardens	Kew	Bulletins.
Manchester Geological Society	Manchester.....	Proceed. and Trans.
Biological Society	Liverpool.....	do
Liverpool Geological Society.....	do	do
Marine Biological Association	Plymouth	Journal.
Belfast Naturalists' Field Club	Belfast	Ann. Rep't and Proc.
Royal Society of Canada	Ottawa	Proceed. and Trans.
Ottawa Field Naturalists' Club	do	Ottawa Naturalist.
Department of Inland Revenue	do	Bulletins.
Entomological Society of Ontario	London, Ont	Can. Entomologist
Hamilton Association	Hamilton.....	Journal.
Natural History Society	Montreal	Can. Record of Scien.
Sir Wm. Dawson	do	Pamphlets.
Historical and Scientific Society of Manitoba..	Winnipeg	Report.
Nova Scotia Institute of Natural Sciences ..	Halifax	Proceedings.
University of Toronto	Toronto	Quarterly.
G. O. F. Matthew.....	St. John.....	Reports on Geology of Italy, Georgia (U. S. A.), and Minne- sota; also 25 p m- phlets on geologi- cal subjects.
Geo. U. Hay	do	Canadian Scientist, Nos 1-11 (1885), Acadian Scientist, 1883-1884, Botanical Notes, by W. T. L. Reed (MSS.), and 175 pamphlets, mostly relating to botany.
John V. Ellis, Jr	do	Proceed. of Victoria Institute of Trinidad
Australian Museum.....	Sydney, N.S.W.	Report.
Australian Assoc. for Advancement of Science	do	Report, Vol. V.
Linnean Society of N. S. W.....	Elizabeth Bay	Proceedings.
New Zealand Institute.....	Wellington, N.Z.	Proceed. and Trans. Vol. XXVII
U. S. Geological Survey	Washington	Reports and Bulletins
U. S. Fish Commission	do	do
U. S. National Museum	do	Reports and Proc.
U. S. Dep't of Agriculture (Botanical Division)	do	Bulletins.
U. S. Coast and Geodetic Survey	do	Report.
Smithsonian Institution.....	do	do.
University of California.....	Berkeley, Cal.	Bulletins.
University of Michigan	Ann Arbor	Report.
Cornell University	Ithaca, N. Y.	Bulletins.
Tufts' College	Tufts' Col., Mass	Studies.
Johns Hopkins University	Baltimore.....	Circulars.
Boston Society of Natural History.....	Boston	Proceedings.
Essex Institute	Salem	Bulletins.
New York Academy of Sciences.....	New York.....	Transactions.
New York Microscopical Society.....	do	Journal.
Linnean Society of New York	do	Abstract of Proceed.
American Museum of Natural History	do	Report.
Linnean Society of New York	do	Abstract of Proceed.

DONATIONS TO THE LIBRARY — (*Continued*).

DONOR'S NAME.	RESIDENCE.	WORK.
Natural Science Association of Staten Island..	New Brighton.	Proceedings.
Rochester Academy of Natural Sciences	Rochester, N. Y.	do
Iowa Academy of Sciences	Des Moines.	do
Academy of Natural Sciences.....	Tacoma	do
Colorado Scientific Society	Denver.....	do
Cincinnati Society of Natural History.	Cincinnati.....	Journal.
C. G. Lloyd	do	Plates.
Missouri Botanical Garden	St. Louis	Annual Report.
Prof. J. Walter Fewkes.....	Boston	Pamphlets.
Field Columbian Museum.....	Chicago	Publications.
Comite Geologique du Russie.....	St. Petersburg. .	Memoirs and Bul'tins
Imperial Academy of Sciences.....	do	Bulletins.
Geological Institute of Upsala.	Upsala	do

PURCHASED.

Among Rhode Island Wild Flowers. By Prof. W. W. Bailey.

DONATIONS TO THE MUSEUM.

Date.	DONOR'S NAME AND DESCRIPTION OF ARTICLE.
1895. <i>Mar.</i>	MRS. JOHN S. MACLAREN. Collection of Plaster Medallions in a Case.
	E. T. P. SHEWEN, Esq., C. E. Two Pieces of Timber from Cape Tormentine, bored by <i>Teredo navalis</i> .
	F. S. THOMPSON, Esq. 75 Specimens of Tropical Shells.
<i>Apl.</i>	GEO. D. BAIN, Esq. Cluster of Spawn of the Conch Shell. Sea Ivory. Pod of <i>Ponciana Regia</i> . From South Coast of Florida.
	JAMES KELLY, Esq. Young Eagle, Mounted. Captured at Bocabee Lake.
	W. M. McLEAN, Esq. Dollar Fish (<i>Stromateus triacanthus</i>), from St. John Harbor. <i>Hemetricterus Americanus</i> , "Sea Raven," St. John Harbor.
	DR. JOHN BAXTER, Chatham, N. B. Piece of Whalebone taken from mouth of a whale thrown on shore at Neguac, N. B.
<i>July</i>	DR. WILLIAM F. GANONG. Dredge Net and Dip Net, the Outfit used by Dr. Ganong during his investigation of The Marine Fauna of the Bay of Fundy.
<i>Aug.</i>	GEOFFREY STEAD, Esq., C. E. Fifty-seven Species Miocene Fossils from Maryland and Virginia, U. S. A. Stauroelite Crystals, from Shelburne, N. S. Plant and Insect remains from peaty layer in clay at Lee's Brickyard, Courtenay Bay. <i>Otenodiscus adspersus</i> , young specimen of the Cunner or Blue Perch, from the "North Shore" of New Brunswick.

DONATIONS TO THE MUSEUM — (*Continued.*)

Date.	DONOR'S NAME AND DESCRIPTION OF ARTICLE
1895.	DR. P. COX AND G. STEAD, ESQ., C. E. <i>Gammarus ornatus</i> , Edm., Courtenay Bay, St. John.
Nov.	ROBERT MATTHEW, ESQ. Quartz Arrow Point, changed to Skin Scraper, and Flake of Carnelian, from Indian Camping Ground, Washademoak Lake. Pod of Locust Tree ("Flamboyant"), Trinidad Cuba.
	JOHN V. ELLIS, JR., ESQ. Bird Nests from British Guiana, and Snake Skin and Mounted Frog from Trinidad. Rolled Pebbles of Asphalt and Commercial Asphalt, Trinidad.
Nov.	W. F. BEST, ESQ. 9 Species of Sea Shells.
Dec.	DR. MCINERNEY, St. John, N. B. Flying Fish (<i>Exocoetus rondeletii</i>), Scorpion (<i>Chelifer Wideri</i>), West Indies.
	PROF. JAMES FOWLER, Queen's College, Kingston, Ont. Collection of Plants, about 1,000 specimens, being the type specimens of the N. B. list (Bulletin No. IV.)
	G. U. HAY, ESQ. Minerals from Blomidon, N. S.

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Wilson.

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